

January 2010

NC7SZ14 TinyLogic[®] UHS Inverter with Schmitt Trigger Input

Features

- Ultra-High Speed: t_{PD} 3.7ns (Typical) into 50pF at 5V V_{CC}
- High Output Drive: ±24mA at 3V V_{CC}
- Broad V_{CC} Operating Range: 1.65V to 5.5V
- Matches Performance of LCX when Operated at 3.3V V_{CC}
- Power Down High Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5V to 3V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages
- Space-Saving SOT23 and SC70 Packages

Description

The NC7SZ14 is a single inverter with Schmitt trigger input from Fairchild's Ultra-High Speed (UHS) series of TinyLogic®. The device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive while maintaining low static power dissipation over a very broad $V_{\rm CC}$ operating range. The device is specified to operate over the 1.65V to 5.5V $V_{\rm CC}$ range. The inputs and outputs are high-impedance when $V_{\rm CC}$ is 0V. Inputs tolerate voltages up to 6V independent of $V_{\rm CC}$ operating voltage.

Ordering Information

Part Number	Operating Temperature	Top Mark	© Eco Status	Package	Packing Method
NC7SZ14M5X	-40 to +85°C	7Z14	RoHS	5-Lead, SOT23, JEDEC MO-178, 1.6mm	3000 Units on Tape & Reel
NC7SZ14P5X	-40 to +85°C	Z14	RoHS	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7SZ14L6X	-40 to +85°C	В6	RoHS	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SZ14FHX	-40 to +85°C	В6	Green	6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

For Fairchild's definition of Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs-green.html.



Connection Diagrams

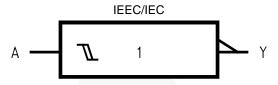


Figure 1. Logic Symbol

Pin Configurations

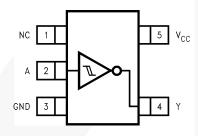


Figure 2. SOT23 and SC70 (Top View)

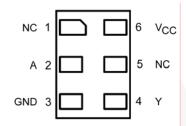


Figure 3. MicroPak (Top Through View)

Pin Definitions

Pin # SOT23 and SC70	Pin # MicroPak	Name	Description
1	1, 5	NC No Connect	
2	2	A	Input
3	3	GND	Ground
4	4	Y Output	
5	6	VCC	Supply Voltage

Function Table

Y = /A

Inputs	Output
Α	Y
L	Н
Н	L

H = HIGH Logic Level

L = LOW Logic Level

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Para	ameter	Min.	Max.	Unit	
V _{CC}	Supply Voltage		-0.5	6.0	V	
V _{IN}	DC Input Voltage		-0.5	6.0	V	
V _{OUT}	DC Output Voltage		-0.5	6.0	V	
1	DC Innut Diada Current	V _{IN} < -0.5V		-50	A	
I _{IK}	DC Input Diode Current	V _{IN} > 6.0V		+20	- mA	
	DC Output Diada Cumant	V _{OUT} < -0.5V		-50	A	
l _{OK}	DC Output Diode Current	$V_{OUT} > 6.0V, V_{CC} = GND$		+20	mA	
I _{OUT}	DC Output Current		±50	mA		
I _{CC} or I _{GND}	DC V _{CC} or Ground Current			±50	mA	
T _{STG}	Storage Temperature Range		-65	+150	°C	
TJ	Junction Temperature Under B	ias		+150	°C	
TL	Junction Lead Temperature (S	oldering, 10 Seconds)		+260	°C	
		SOT-23		200		
D	Davida Diagination at 10500	SC70-5		150	\^/	
P_D	Power Dissipation at +85°C	MicroPak-6		130	mW	
		MicroPak2-6		120		
FOD	Human Body Model, JEDEC:JE	ESD22-A114		4000		
ESD	Charge Device Model, JEDEC:		2000	V		

Recommended Operating Conditions⁽¹⁾

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min.	Max.	Unit	
V	Supply Voltage Operating		1.65	5.50	V	
V _{CC}	Supply Voltage Data Retention		1.5	5.5] V	
V _{IN}	Input Voltage		0	5.5	V	
V _{OUT}	Output Voltage		0	Vcc	V	
T _A	Operating Temperature		-40	+85	°C	
		SOT-23		300	\leq	
0	T	SC70-5		425	°C/W	
$ heta_{\sf JA}$	Thermal Resistance	MicroPak-6		500	- C/VV	
		MicroPak2-6		560]	

Note:

1. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

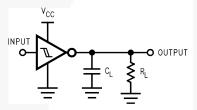
Symbol	Parameter	V (V)	$T_{A}=+25^{\circ}$ C $T_{A}=-40 \text{ to } +85^{\circ}$	T _A =+25°C		to +85°C	C │ ── Unit		
Symbol	Parameter	V _{CC} (V)	Conditions	Min.	Тур.	Max.	Min.	Max.	Ulli
		1.65		0.60	1.00	1.40	0.60	1.40	
		1.80		0.70	1.10	1.50	0.70	1.50	
	Positive Threshold	2.30		1.00	1.40	1.80	1.00	1.80	
V_P	Voltage	3.00		1.30	1.75	2.20	1.30	2.20	
		4.50		1.90	2.45	3.10	1.90	3.10	
		5.50		2.20	2.90	3.60	2.20	3.60	
		1.65		0.20	0.50	0.80	0.20	0.80	
		1.80		0.25	0.55	0.90	0.25	0.90	
\/	Negative Threshold	2.30		0.40	0.75	1.15	0.40	1.15	V
V_N	Voltage	3.00		0.60	1.00	1.50	0.60	1.50	V
		4.50		1.00	1.43	2.00	1.00	2.00	
		5.50		1.20	1.70	2.30	1.20	2.30	
- //		1.65		0.10	0.48	0.90	0.10	0.90	
		1.80		0.15	0.54	1.00	0.15	1.00	
.,		2.30		0.25	0.65	1.10	0.25	1.10	١,,
V _H	Hysteresis Voltage	3.00		0.40	0.77	1.20	0.40	1.20	V
		4.50		0.60	1.01	1.50	0.60	1.50	
		5.50		0.70	1.18	1.70	0.70	1.70	
		1.65		1.55	1.65		1.55		
		1.80		1.70	1.80		1.70		
		2.30	V _{IN} =V _{IL} ,	2.20	2.30		2.20		
		3.00	I _{OH} =-100μA	2.90	3.00		2.90		
	HIGH Level Output	4.50		4.40	4.50		4.40		
V_{OH}	Voltage	1.65	I _{OH} =-4mA	1.29	1.52		1.29		V
		2.30	I _{OH} =-8mA	1.90	2.15		1.90		
		3.00	I _{OH} =-16mA	2.40	2.80		2.40		
		3.00	I _{OH} =-24mA	2.30	2.68	1	2.30		
		4.50	I _{OH} =-32mA	3.80	4.20		3.80		
		1.65			0.00	0.10		0.10	
		1.80	1		0.00	0.10		0.10	
		2.30	V _{IN} =V _{IH} , I _{OL} =100μΑ		0.00	0.10		0.10	
		3.00	IOL=TOOPA		0.00	0.10		0.10	
	LOW Level Output	4.50			0.00	0.10		0.10	
V_{OL}	Voltage	1.65	I _{OL} =4mA		0.08	0.24		0.24	V
		2.30	I _{OL} =8mA		0.10	0.30		0.30	
		3.00	I _{OL} =16mA		0.15	0.40		0.40	
		3.00	I _{OL} =24mA		0.22	0.55		0.55	
		4.50	I _{OL} =32mA		0.22	0.55		0.55	
I _{IN}	Input Leakage Current	0 to 5.5	V _{IN} =5.5V, GND			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current	0	V _{IN} or V _{OUT} =5.5V			1		10	μA
Icc	Quiescent Supply Current	1.65 to 5.50	V _{IN} =5.5V, GND			1.0	1	10	μA

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	/ _{CC} (V) Conditions		Γ _A =+25	°C	T _A =-4 +85°		Units	Figure
-				Min.	Тур.	Max.	Min.	Max.		
		1.65		2.0	9.1	15.0	2.0	15.6		
		1.80		2.0	7.6	12.5	2.0	13.0	ns	Figure 4 Figure 5
		2.50 ± 0.20	$C_L=15pF$, $R_L=1M\Omega$	1.0	5.0	9.0	1.0	9.5		
t _{PLH} , t _{PHL}	Propagation Delay	3.30 ± 0.30	11122	1.0	3.7	6.3	1.0	6.5		
		5.00 ± 0.50		0.5	3.1	5.2	0.5	5.5		
		3.30 ± 0.30	C _L =50pF,	1.5	4.4	7.2	1.5	7.5		Figure 4
		5.00 ± 0.50	R _L =500Ω	0.8	3.7	5.9	0.8	6.2		Figure 5
C_{IN}	Input Capacitance	0.00			4				pF	
C_{PD}	Power Dissipation	3.30			24					Figure 6
OPD	Capacitance ⁽²⁾	5.00			30					rigule 6

Note:

2. C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. C_{PD} is related to I_{CCD} dynamic operating current by the expression: I_{CCD}=(C_{PD})(V_{CC})(f_{IN})+(I_{CC}static).



Note:

 C_L includes load and stray capacitance; Input PRR=1.0MHz; t_W=500ns

Figure 4. AC Test Circuit

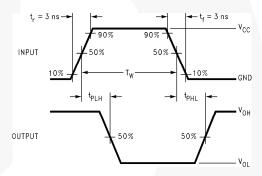
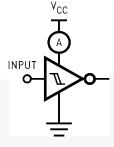


Figure 5. AC Waveforms



Note:

4. Input=AC Waveform; t_r=t_f=1.8ns; PRR=10MHz; Duty Cycle =50%.

Figure 6. I_{CCD} Test Circuit

Physical Dimensions

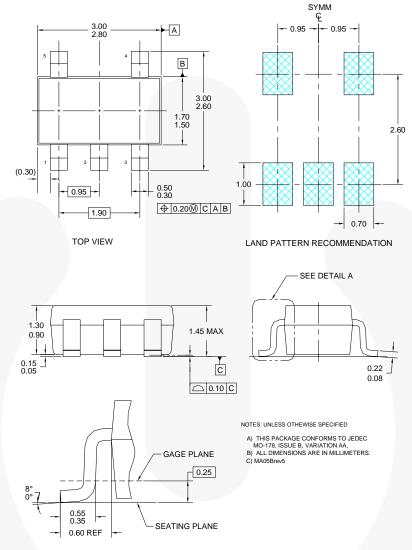


Figure 7. 5-Lead SOT23, JEDEC MO-178 1.6mm

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Tape and Reel Specifications

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: http://www.fairchildsemi.com/packaging/SOT23-5L tr.pdf.

Package Designator	kage Designator Tape Section		Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
M5X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions (Continued)

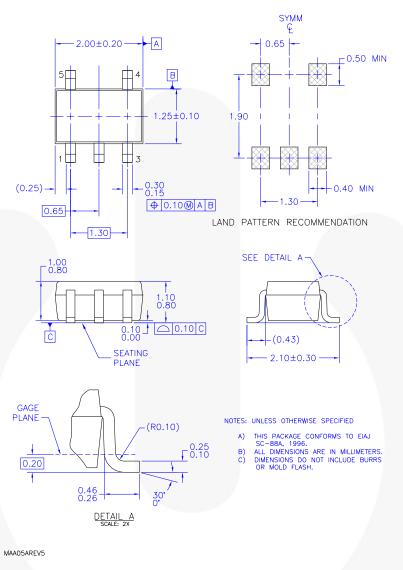


Figure 8. 5-Lead, SC70, EIAJ SC-88a, 1.25mm Wide

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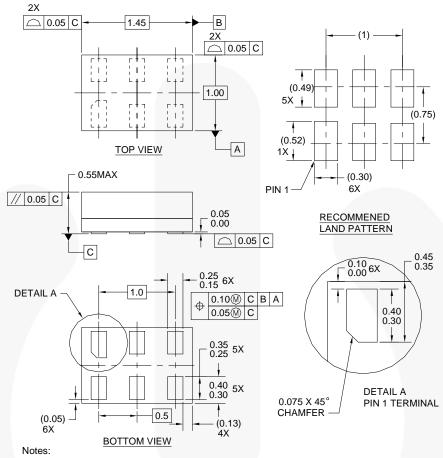
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Tape and Reel Specifications

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Package Designator	Tape Section Cavity Number		Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
P5X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions (Continued)



- 1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06AREVC

Figure 9. 6-Lead, MicroPak™, 1.0mm Wide

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Tape and Reel Specification

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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
L6X	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions (Continued)

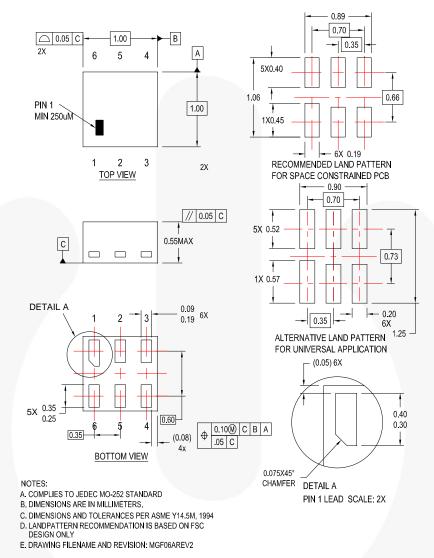


Figure 10. 6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch

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Tape and Reel Specification

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: http://www.fairchildsemi.com/packaging/MicroPAK2 6L tr.pdf.

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
FHX	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed





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